MEMU20

20th November ~ 23rd November; 2020

NATIONAL CONFERENCE

ON

Modern Engineering Materials and Uses.

CONFERENCE PROCEEDING

NIT, Bhubaneswar

Nalanda Institute of Technology, Bhubaneswar

Organized by

Department of Civil and Mechanical Engineering

Nalanda Institute of Technology

Bhubaneswar - 752050

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ABOUT THE CONFERENCE

Science and materials has continuously evolved through decades. MEMU 2020 was organized in Nov - 2020 and was successful in capturing the development of materials and processing. Department of Civil and Mechanical Engineering, NIT, Bhubaneswar is organizing MEMU 2020 to showcase recent advances in materials processing and applications. In keeping up with the research interest of the materials community, MEMU 2020 will provide an update on scientific and technical aspects covering broad areas of interests in engineering construction materials, processing and applications.

ABOUT THE DEPARTMENT

The Department of Civil and Mechanical Engineering has been in existence since 2009 with the inception of the college with an initial intake capacity of 60 and is producing high quality technical manpower needed by industry, R&D organizations, and academic institutions. The intake capacity was enhanced to 120 in the year 2011.The Department has full fledged faculty members who are specialized in the fields of design, thermal, production and CAD/CAM. Laboratories are fully equipped to enhance the knowledge of the student, periodic industry trips and visits to various project sites are arranged. Special lectures and seminars are held on a frequent basis to assist them tailor in their particular areas of interest and trying hard to transform students of even mild talent to professionals in the mechanical and mechatronics field. Already more than 750nos of alumni have been produced so far, placed in different Government, private, Public & other sectors and some of them have pursued higher studies. However, with the progress of time, many more frontier areas of mechanical engineering have been taken up for active research.

ABOUT THE INSTITUTE

Established in the year 2007, Nalanda Institute of Technology (NIT) is one of the premier engineering colleges in the self-financing category of Engineering education in eastern India. It is situated at temple city Bhubaneswar, Odisha and is a constituent member of Nalanda Educational Trust. This reputed engineering college is accredited by NAAC, UGC and is affiliated to BPUT, Odisha. NIT aims to create disciplined and trained young citizens in the field of engineering and technology for holistic and national growth.

The college is committed towards enabling secure employment for its students at the end of their four year engineering degree course. The academic fraternity of NIT is a unique blend of faculty with industry and academic experience. This group of facilitators work with a purpose of importing quality education in the field of technical education to the aspiring students. Affordable fee structure along with approachable location in the smart city of Bhubaneswar, makes it a preferred destination for aspiring students and parents.

The Institute works with a mission to expand human knowledge beneficial to society through inclusive education, integrated with application and research. It strives to investigate on the challenging basic problems faced by Science and Technology in an Inter disciplinary atmosphere and urges to educate its students to reach their destination, making them come up qualitatively and creatively and to contribute fruitfully. This is not only its objective but also the ultimate path to move on with truth and brilliance towards success.

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VICE CHAIRMAN MESSAGE

On behalf of the Organizing Committee, it is my great pleasure to welcome you to National Conference on Modern engineering materials and uses (MEMU2020). In our endeavour to raise the standards of discourse, we continue to remain aware in order to meet with the changing needs of our stakeholders. The idea to host the MEMU-2020 is to bring together Researchers, Scientists, Engineers, Scholars and Students in the areas of Civil and Mechanical Engineering. The MEMU-2020 Conference will foster discussions and hopes to inspire participants from a wide array of themes to initiate Research and Development and collaborations within and across disciplines for the advancement of Technology.The conference aims to bring together innovative academic experts, researchers and Faculty in Engineering and Management to provide a platform to acquaint and share new ideas. The various thematic sessions will showcase important technological advances and highlight their significance and challenges in a worldof fast changes. I welcome all of you to attend the plenary sessions and invite you to interact with the conference participants. The Conference Committees will make any possible effort to make sure that your participation will be technically rewarding and a pleasurable experience.

I am looking forward to meeting you in during MEMU-2020 and to sharing a most pleasant, interesting and fruitful conference.

With regards,

Prof. Malaya Kumar Padhi
Vice. Chairman
Nalanda Institute of Technology, Chandaka
Bhubaneswar, Odisha

PRINCIPAL'S MESSAGE

It gives me great pleasure to welcome you to the National Conference on "Modern engineering materials and uses" (MEMU-2020), which will take place from November 20–23, 2020.

This conference's goal is to spread knowledge among other educated people in addition to discussing current, hot topics in a certain field. Dramatic advancements have been made in engineering and technology over the years. I am hoping that MEMU-2020 will turn out to be the most beneficial national conference devoted to showcasing the newest developments in engineering and technology.

We have asked eminent specialists to participate in the Technical Programs in order to give an exceptional technical level for the conference presentations. Technical seminars and keynote plenary sessions will be held.
I hope MEMU-2020 will make you aware of state-of-the art systems and provide a platform to discuss various emerging technologies in Civil and Mechanical Engineering.

With regards,
Prof. (Dr.) N.H.S. Ray
Principal
Nalanda Institute of Technology, Chandaka
Bhubaneswar, Odisha

CONVENER'S MESSAGE

National Conference on "Modern engineering materials and uses" (MEMU 2020) is a prestigious event jointly organized by Mechanical and Civil Engineering Department with a motivation to share a progress in recent technologies. The objective of MEMU 2020 is to present the latest research and results of scientists (preferred under graduate and post graduate students, research scholars, post-doc scientists, academicians and working professionals) related to the subjects of Mechanical and Civil Engineering. The conference will provide with paper presentations and research paper presentation by prominent speakers who will focus on related state-of-the-art technologies in the areas of the conference.

I wish all the success to the conference MEMU 2020.

With regards,
Prof. B. P. Samal

Professor and HOD of Mechanical Engineering
Nalanda Institute of Technology, Chandaka
Bhubaneswar, India

Contents

Learn Production and World Class Manufacturing:A Comparative Study of the Two Most ImportantProduction Strategies of Recent Times

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Abstract

As a consequence of the rising competition in the markets and of the growing economic crisis that has affected most of the manufacturing industries worldwide, many companies have sought solutions to improve their productive performance. Because of this, Lean Production and World Class Manufacturing are the two most popular strategies which companies have tried to adopt with results that not always are most satisfactory. This Research Paper has the objective of identifying the reasons that may have caused the failure of these strategies, using analysis and comparison, to reveal their differences and the reasons why the full understanding of these differences is of fundamental importance in the choice between one or the other. The research period covered is that of the last 30 years (1986-2018) and the research can be classified as a systematic literature review, from a theoretical and qualitative point of view. The results of this paper show how, although the two manufacturing strategies share many common aspects, they do present some important differences, which can be attributed in some part to the different cultural context in which they developed. This paper also provides the tools for a better understanding of Lean and World Class Manufacturing literature and can be used as a useful support for further new research on these subjects.

Keywords

Lean manufacturing, World class manufacturing, Production strategy

Micro-robotic handling solutions for PCB (re-)manufacturing

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Abstract

The extensive research conducted over the past few decades on a range of electronic devices in an effort to boost their performance while also making them smaller has brought up new concerns regarding their creation, remanufacturing, and reuse after their useful lives have passed. With regard to the high specifications, this scenario presents additional difficulties that must be overcome through improved or new production methods, creative systems, and cutting-edge tactics. This paper highlights certain difficult applications that take advantage of new automatic solutions at various process complexity levels, from the component to the entire system, including the devices, tools, and robotized work-cells created by the authors.

Keywords: Micro-assembly robotics; electronics manufacturing; PCB remanufacturing; collaborative robotics; micro-handling.

ASSESSMENT OF GREEN ROOFS AS ECO-FRIENDLY TECHNIQUE FOR MANAGING THE QUANTITY AND QUALITY OF URBAN STORM WATER

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Abstract.

Given the steadily rising greenhouse gas emissions and quickening urbanisation that are accelerating climate change, promoting green building design, construction, repair, and operation has never been more important. Green Building Index (GBI), which was developed in Malaysia to drive initiative to push the property industry towards becoming more environmentally friendly, was motivated by environmental requirements. This grading system's assessment criteria for sustainable site development and management includes a green roof system. In order to collect scientific data on the system, a huge green roof was built at the Humid Tropics Center (HTC) in Kuala Lumpur as one of the components for Stormwater Management Ecohydrology (SME). This study assesses the effectiveness of the Humid Tropics Center's vast green roof in reducing urban heat islands and regulating the quantity and quality of runoff. Results show that the building's interior temperature decreased by about 1.5°C after the green roof was installed. According to simulations, the peak discharge was cut by up to 24% when compared to an impervious brown roof. The runoff produced by the green roof showed an increase in pH and a high quantity of phosphate, and its water quality fell between classes I and II according to the INWQS.

Review of solar drying technologies

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Abstract:-
Solar energy is used for a variety of purposes, including drying. Drying is the process of removing moisture from a thing. Drying aids in the long-term preservation of food products and guards against product contamination. Several solar drying techniques include direct solar drying, indirect solar drying, and mixed mode solar drying. A drying method that is primarily exposed to the sun or direct sunlight is utilised. It does, however, have significant drawbacks. By using an indirect type of drier, which uses solar energy to dry things, these drawbacks can be avoided. In this article, we looked at different drying methods and different solar drying configurations.

Keywords:- Direct type solar dryer, Indirect type solar dryer, Natural circulation solar dryer, Forced circulationsolar dryer.

A comparison of the Project Evaluation and Review Technique (PERT) with the Critical Path Method (CPM)

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Abstract

Project evaluation and review technique (PERT) and the critical route method were employed by a building construction company (CPM). There was discussion of the numerous tasks involved in building the house. The oldest occurrences, latest beginnings, and finish of activities were determined using forward and backward pass computations in CPM. Critical pathways were identified using PERT and CPM. According to the study, there was just one day between the two methodologies in terms of the time it took to finish the house project utilising CPM and PERT. The likelihood that the house construction project could be completed in 151 days was 99.87%. This implies that both approaches could be employed to complete the house construction project on time. Nonetheless, the results showed that applying both CPM and PERT techniques in a house construction project is effective and successful.

Keywords

Technique for project evaluation and review, a critical path approach, oldest projects, activities, and events

Solar energy generation for electricity

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Abstract

Energy is currently the primary factor driving social growth. Nonetheless, the growing level of environmental concern makes the interest in renewable energy crucial. The utilisation of this alternative energy source is rapidly increasing due to the continual depletion of fossil fuels. It is derived from natural sources like the sun, wind, rain, etc. Among the unconventional, renewable energy sources, solar energy has one of the biggest potentialities for conversion into electric power. A solar system should generate as much power as feasible to increase efficiency. For maximum power output, keep the panels facing the sun.

In this essay, the topic of solar energy-based electricity production is covered. The suggested solution ensures that the conversion of solar energy into electricity is optimised by precisely arranging the panel in relation to the position of the sun. The Stepper motor that powers the paper intelligently moves a panel in response to a light sensor's determination of the sun's light intensity.

Selection of force creation method for press forming machinery

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Abstract

The importance of environmental considerations in business today has increased. This has led to a rise in the demand for fiber- based packaging options, which offer an eco-friendly and sustainable alternative to materials based on oil. Paperboard is one of these materials, and paperboard trays, for instance, can replace the conventional plastic trays used in food packaging. Small-scale, cost-effective machinery is required today. The goal of this study was to determine the most effective way to generate the force required by the little paperboard tray pressing machine. In this article, two distinct force generating strategies were examined utilising SWOT and Score Table analyses. Findings show that compared to the hydraulic system, the electric actuator system has a number of important features.

Keywords: Press Forming methods, Paperboard tray, Hydraulic System, Electric actuator, SWOT-analysis, Score Table.

PROBLEMS IN SOFT SOIL CONSTRUCTION: CASE STUDIES FROM MALAYSIA

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Abstract.

Geotechnical engineering faces significant challenges when building on soft ground. Due to the low shear strength and high compressibility of this soil, numerous technical issues, such as slope instability, bearing capacity failure, or excessive settlement, could arise during or after the construction phase. As the primary technical organisation in charge of carrying out development projects for the Government of Malaysia, the Public Works Department has a wealth of experience in dealing with this challenging soil. This study reviewed and elaborated on the engineering issues found in PWD-conducted construction projects, Specifically, the Hospital Tengku Ampuan Rahimah Integration Quarters in Klang, Selangor, and the Core Facilities Building of the Polytechnic Kota Kinabalu in Sabah. In Selangor, ground instability during construction caused a delay and cost overrun in project completion, whereas in Sabah, ongoing post-construction settlement compromised the structural integrity and usability of the building. Both projects' failure factors and suggested remediation activities will be briefly discussed.

Keywords: Slope instability, bearing capacity failure, excessive settlement.

Analyse of the current situation of the Russian Federation's road and rail transportation infrastructure

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Abstract. The reliability and regularity of transportation services, as well as the dynamic development of the national economy, depend heavily on the transportation system. The unified transportation system consists of all modes of conveyance, all forms of transportation, commercial companies, and organisations that handle movement of people and products. The principal benefits, drawbacks, and technicalities of railroad transportation are covered in this article. Presently, the Russian Federation's transport system serves as the hub for the bulk of commercial and transportation linkages between the countries of Europe, Central Asia, and Southeast and East Asia. This is because of the Russian Federation's unique geographic location. The biggest Russian shipping businesses' traits are listed. the primary components of Russia's railway industry's infrastructure. The major issues with the Russian Federation's railway industry's operation are highlighted. There is a comparison of the rail networks of China, India, the United States, and Russia. A SWOT analysis was performed to evaluate the advantages and disadvantages of Russian rail and road transportation.

Designing a robotic welding cell for bus body frame using a sustainable way

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Abstract

Using automated technologies to carry out tasks in the automotive industry has a number of advantages over using humans. Using automation systems offers substantial advantages in terms of reliability, safety, and quality. Buses, ambulances, and garbage trucks, among other types of vehicles, are produced by smaller companies that specialise in a certain vehicle genre. Due to the small production series quantities and the high rate of client customization, fully automated manufacturing lines cannot be utilised. This study's objectives were to determine the advantages of using a robotic welding cell to construct bus body structures and to keep track of its use throughout the production process. To create a reliable data comparison, it was chosen to use a subset of the bus's data.

Keywords: Robotic; Welding; Automation; Bus; Safety; Quality.

Collaborative robots in e-waste management

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Abstract

The public and the government are putting more pressure on industrial enterprises these days to lessen the impact of their operations on the environment. However categorising and disassembling electronic gadgets when dealing with e-waste presents certain challenges. Due to the absence of homogeneity among the rejected devices, full automation is also discarded because manual operations are economically unviable. Letting a human operator and a robot share the process is a midway measure. The objective of this research is to optimise the electronic equipment recycling process while applying both technical and economic criteria and taking into consideration the most recent advancements in collaborative robot technology.

Effects of harsh circumstances' high-frequency cyclic loading on the mechanical and structural properties of rail steel

Dr. Sivasubramaniam[1*] & Dr. Edara Krishna Reddy[2]
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Abstract.

This work addresses current difficulties with the alteration of steel's microstructure and microhardness under the effect of high-frequency vibrations seen in technology pipelines connected to pump and compressor equipment. Optical microscopy and microhardness testing were employed by the authors to examine the microstructures of samples under the influence of high-frequency loading. The process of modelling, then designing and building railways while taking into account a variety of geometric and mechanical properties is timely and relevant because it is most needed while building artificial constructions in the Arctic, because of the wide temperature disparity and variations in the temperature coefficients of various materials. Studying the mechanical and structural properties of 40X steel under high-frequency loading conditions is the goal of this investigation. The samples were created by the authors using a rod of 40X steel with a 12 mm diameter for mechanical and structural testing. By performing tension tests, fatigue tests, structural analysis (metallographic studies), and microhardness tests, the strength characteristics of steel were assessed.

Method for design of human-industrial robot collaboration Work Stations

Dr.Birajendu Prasad Samal [1*] & Mr. Om Prakash Samal[2]

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Abstract

A HIRC design methodology for early production development stages is required in order to properly utilise a 3D simulation tool capable of analysing hand-guided human-industrial robot collaboration (HIRC) work activities. This article suggests an HIRC design approach that makes use of the demonstration software's potential in the creation of HIRC workstations. The approach is based on Pahl and Beitz's engineering design method, which it interprets into HIRC design-specific phases and activities.

Air pollution with oil products in the area of railway tank stops

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Abstract.

At the stops for tanks holding oil products, there are issues with guaranteeing safety while adhering to technical rail transport rules. Priority pollutants are listed along with a basic list of the contaminants that are released into the air while railroad tank cars are parked. The factors that affect the railway parking area's pollution have been regulated, and the gross emissions have been quantified. The removal of railroad stopping places and the realisation of the transit of oil and oil products outside of the residential zone of an industrial city with a million inhabitants are required for the actual execution of the preservation of the air environment of the city of Voronezh. This is true for both short-term and long-term deployment places for oil product-carrying railroad tank cars. It has been demonstrated that the safety data sheet for the facility itself, which belongs in the category of potentially hazardous facilities, coordinates the inspection and control of certain tank washing sites.

Intelligent Systems for Civil Engineering: Advanced Applications: A Review

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Abstract:

The field of artificial intelligence (AI) focuses on the design and usage of intelligent machines. Large amounts of processing power are required to solve difficult problems, but AI-based technologies may offer more straightforward alternatives. As a result, the usage of AI has increased recently in a number of technological sectors, including civil engineering in particular. On the other hand, little research has been done employing AI approaches in the field of civil engineering. With the development of machine learning techniques in recent years, big data and deep learning developments have been successfully implemented in many fields of civil engineering. This paper explores how artificial intelligence has been used and developed in civil engineering in recent years, including these techniques. By the work of this article, it is possible to learn about recent developments in artificial intelligence research and the difficulties it has faced in the field of civil engineering. In this work, machine learning methods, intelligent algorithms, big data, and deep learning are discussed as applications of artificial intelligence in civil engineering.

Keywords: Artificial Intelligence; Artificial Neural Networks; Civil Engineering; Expert Network; Fuzzy Network; Machine Learning Techniques; Swarm Intelligence.

Engineering Use of In-Situ Stress Calculation

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Abstract.

The key factor influencing the stability of subsurface structures and the movement of oil and gas underground is in-situ stress. It is crucial for the application of engineering, the use of oil and gas, and the assurance of safety. In order to quantify the ground stress and assess the stability of the surrounding rock, a layered model is created through the study of logging curves in order to extract the pertinent rock mechanical parameters. Oil and gas exploitation and the execution of drilling targets are both guided by the in-situ stress determined by parameter extraction.

Design and Fabrication of Gates and Arduino Controlled Vertical Axis Wind Turbines

Mr. Ajay Kumar Sahoo [1*] & Om Prakash Samal[2]
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ABSTRACT:

Since gears play an important role in mechanical power transmission, a huge amount of work has been done on them to prevent breakage, noise and vibration, or to increase aspects of strength and density. This work uses a cycloidal profile rather than developing its ability to withstand the bending stress of a straight fit. The main objective is to investigate the effect of modulus, taper angle and roll radius on bending stress. From the generation process, the 3-D models are mathematically described as a set of points representing the cycloidal profile, which are fed into the FE solution. The proposed mathematical geometric model of cycloid gear was compared with existing published works and showed perfect consistency. Flexural strength is estimated based on vonmiss stress. The results show that the modulus plays a key role in minimizing the bending stress, the higher the modulus, the lower the bending stress value, reducing the roll radius can well control the bending stress, while increasing the taper angle leads to the reduction of the bending stress.

Keywords: convulsions; Cycloid profile; Fillerestress .

Micro-robotic handling solutions for PCB (re-)manufacturing

Mr. Avaya Kumar Baliarsingh[1*] & Dr. Atul[2]

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Abstract

The extensive research conducted over the past few decades on a range of electronic devices in an effort to boost their performance while also making them smaller has brought up new concerns regarding their creation, remanufacturing, and reuse after their useful lives have passed. With regard to the high specifications, this scenario presents additional difficulties that must be overcome through improved or new production methods, creative systems, and cutting-edge tactics. This paper highlights certain difficult applications that take advantage of new automatic solutions at various process complexity levels, from the component to the entire system, including the devices, tools, and robotized work-cells created by the authors.

Keywords: Micro-assembly robotics; electronics manufacturing; PCB remanufacturing; collaborative robotics; micro-handling.

Testing successful Business Model using System Dynamics

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Abstract:

Managing ongoing change while remaining competitive and dynamic has become a top concern for businesses in the industrial sector in our more globalised economy. The firm's value generation methodology is one of the factors in achieving this competitiveness. The biggest problems in businesses are characterised by dynamic complexity, which makes it hard to comprehend the forces that affect them in their environment. As a result, management and decision-making are impeded (Antunes et al., 2011). Business models exhibit complexity and dynamic change. The many possible variables that can be included in the system and the various consequences that can have both short- and long-term effects on the system make performance of the firm a difficult topic. Its complexity necessitates a comprehensive approach. As a result of having a systemic perspective, managers are better equipped to base their judgements on facts rather than feelings and past experiences since they are aware of how the entire system functions. Consequently, the primary goal of this research is to support and sustain enterprises in the identification of novel constructs connected to their business model by using an empirical instrument like System Dynamics (SD) (BM).

Key words: Business Model, Business Model Design, firm performance, System Dynamics, Decision Making.

Using MATLAB SimEvents, traffic engineering simulation of campus area transportation

Mr. Rajendra Roul[1*] & Ms. Deepali Barik[2]

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Abstract.

Because there are more vehicles on the road than the available space on the highway can handle, there is traffic congestion. This syndrome frequently manifests in densely populated places with active local communities. This scenario typically occurs on college campuses. Along with the viability of facilities and the capacity of the roadway surrounding the campus, one of the criteria for an orderly traffic community is the smooth traffic system. The different campus activities, such as crossing the street, parking cars, and others, often produce traffic congestion surrounding the university. The amount of public cars that pass, activities outside the campus such as the entrance and exit of vehicles to an agency, and others all have an impact on this congestion. In this research, several alternate approaches to resolving congestion issues are put forth utilising a traffic engineering simulation that is carried out using the SimEvents MATLAB programme. It is envisaged that this method will enable analytical evaluation of the traffic engineering's accuracy, efficacy, and efficiency. The queuing model served as the foundation for the traffic engineering simulation.

Coordination of capacity expansion for transport engineering companies with amount of high-speed traffic

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Abstract.

The article provides a model of interaction between a national transport engineering enterprise and a business that purchases a vehicle, ensuring coordination of the interests of consumers and the manufacturer while taking into account the anticipated demand for passenger transportation in high-speed traffic.

Using Integrated Energy Supply Systems For Agriculture That Employ Renewable Energy

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Abstract.

With the high energy needs on the one hand and the detrimental environmental effects of fossil fuels on the other, many nations view alternate sources of energy as an acceptable and practical option in various industries, such as agriculture. A fine balance must be struck between increasing agricultural yield and maintaining economic stability while minimising the use of finite natural resources and adverse environmental repercussions. Therefore, it is necessary to encourage the use of renewable energy systems for sustainable agriculture. This article provides a current overview of the many updated and practical technology for uses of renewable energy in the agricultural industries. It also covers the relevance of renewable energy as the most dependable energy source and a technology that is environmentally friendly. This study examines a variety of renewable energy sources, including hydropower, biomass energy, and solar power. Such renewable energy sources have demonstrated to be suitable alternatives in agriculture, particularly for isolated rural locations.

Walk-through programming for industrial applications

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Abstract

Collaboration between humans and robots is increasingly desired in several application domains, including the manufacturing domain. The paper describes a software control architecture for industrial robotic applications allowing human-robot cooperation during the programming phase of a robotic task. The control architecture is based on admittance control and tool dynamics compensation for implementing walk-through programming and manual guidance. Further steps to integrate this system on a real set-up include the robot kinematics and a socket communication that sends a binary file to the robot.

Keywords: Physical human robot interaction; cooperative robotics; admittance control; walk-through programming.

Autonomous Manufacturing of Composite Parts by a Multi-Robot System

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Abstract

This study takes into account an autonomous multi-robot pick-and-place process that includes the phases of picking, transferring, dropping, and post-drop treatment and is used to manufacture aeronautical structures. Combining computer vision assisted grasping, automated transfer path creation, and generic process execution in one system enables autonomous production. The test scenario involves two collaborating robots positioned on a common linear axis positioning an aeroplane skin demonstrator consisting of customized carbon fibre multiaxial textiles in a half-shell shaped jig with a diameter of roughly 4 m.

Interactive simulation of human-robot collaboration using a force feedback device

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Abstract

In this study, we show how interactive simulation can be used to validate and improve workcells. The suggested method places the design engineer or production planner inside a dynamic virtual model of the plant using real-time physics simulation. The user can communicate with both the parts and tools and the robots as they carry out their assigned duties, including cooperative actions. Force feedback devices can imitate the hand guiding role of delicate, lightweight robots. The assembly process simulation can be used to directly test future application scenarios. An improved comprehension of the dangers, complexity, and prospective improvements can be attained as a result of this first-person 3D experience. With this information, it is possible to specify the initial working and protection regions for safety programming during the early planning stages. They are essential for the security of human-robot collaboration. In addition to safety, the simulation also allows for the optimization of process reliability.

Keywords: Interactive simulation; collaborative robotics; manufacturing ergonomics; modelling and simulation; force feedback; human factors; smart manufacturing.

Prioritization of patients in ICU: composite approach ofmultiple-criteria decision-making and discrete event simulation

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ABSTRACT

Goal: This article aims to present a systematic approach to improve the resource allocation and human queues prioritization patterns.

Design / Methodology / Approach: To achieve such a purpose, effective criteria using a fuzzy-Delphi method, and subject-related researchers' views were obtained. Utilizing the Analytic Network Process method, the weights of each criterion was measured. Then, considering the established weights and using a fuzzy-TOPSIS method, a prioritization system via Discrete Event Simulation was developed.

Results: Results indicate that the established approach properly improved the performance of the prioritization system in terms of resources and facilities allocation in neurology's ICUs.

Limitations of the investigation: A drawback of this research can be in states of emergency which limits the options at hand and the criteria proposed may set a drawback on the aim of the study.

Practical implications: The results show that the proposed model can modify patient entry based on multiple criteria in terms of productivity and social justice in the patient queuing strategy.

Originality / Value: The contribution of this research is threefold: the literature has been reviewed to conclude the criteria concerning decisions around ICUs, the concluded criteria filtered through an expert panel which can be relied based on the method, a real application of the steps proposed is presented which allows comparing the accuracy and efficiency of the decisions made in the hospitals.

Keywords: Hospital Equipment Allocation; Fuzzy set theory; FANP; FTOPSIS; Discrete Event Simulation.

Design changes to the USCG Polar Class Aft Sterntube Bearing

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ABSTRACT

The POLAR SEA and POLAR STAR are two Polar Class Icebreakers that are operated by the U.S. Coast Guard (USCG). These are the largest non-nuclear icebreakers in the world with a displacement of 13,500 tonnes, a length of 399 feet, and a maximum rating of 3 x 20,000 shaft horsepower. Two sterntube bearings that are greased with water support each propeller shaft. Dove-tail slot-staves make up the bearings. Thordon XL is used for both the forward and backward bearing materials (Polymer Alloy). Five lands that are a part of the stern bossing support the bearing housings. Because of the harsh operating environment's effects on the lands' erosion, fretting, and corrosion, the bearing housing doesn't have enough support. Previous attempts to improve the fit of the bearing housings have depended on building up the lands using Belzona Super Metal due to worries about welding on the massive HY-80 casting (a machinable grade metallic polymer). The lands have been periodically undercut and bored to make them fit for this application. This type of repair has shown to be expensive to maintain and has a short lifespan. A project was started to create a long-term fix and/or redesign that would adequately address the fit loss and offer a solid bearing. We looked at the bearing design arrangement, paying close attention to ice-class service requirements. The properties of potential chocking and bearing materials were assessed. Modifications to the bossing and bearing length were also examined. This paper presents the results of the study.

Review on Heat Transfer Enhancement by Rectangular Fin

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ABSTRACT

Heat generation of engineering appliances has bad effect in handling the system can cause the trouble, short life cycle of machines, frequent maintenance requirements and low reliability of systems. The passive cooling technique has been widely used to solve such problems. This review work summarizes the heat transfer enhancement technique in a rectangular fin with economic way. So many research about the enhancement of heat transfer by rectangular finsexperimentally and numerically and found very significant result. In this review, various types of rectangular fin structures are studied simultaneously. It is revealed through reviewing the related literature that the highest value ofequivalent heat transfer enhancement is found the increase in average heat transfer performance of inverted triangular notched fin 50.51% as compared with plane rectangular fin and the perforated fin total heat transfer rate increasedby 38.9% compared to regular fin. Furthermore, by reduction of the optimal fin spacing, heat flux can be changedby 20% in standard rectangular fin when compared with regular fin spacing. Also cooling performance of the inclinedrectangular fin with 60° of tilt angle is seen to be as 6% higher than solid rectangular fin. This article can be considered as a benchmark in the practical application for enhances the heat transfer rates.

Keywords: Heat Transfer Enhancement, Rectangular Fin, Active Method, Various Fin, Passive Method, Fin geometry.

LEAN MANUFACTURING: A REVIEW

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Abstract

Due to the intensifying market competition and the expanding economic crisis that has impacted the majority of the manufacturing industries globally, many businesses have looked for ways to increase their level of productivity. Because of this, corporations have adopted the two most popular strategies—Lean Production and World Class Manufacturing—with results that aren't necessarily the most gratifying. This research paper's goal is to pinpoint the factors that may have contributed to the failure of these strategies by analysing and contrasting them in order to highlight their differences and explain why a thorough comprehension of these differences is crucial when deciding which strategy to employ. From a theoretical and qualitative standpoint, the research can be categorized as a systematic literature review because it covers the last 30 years (1986–2018). The findings of this study demonstrate that while the two manufacturing techniques have many things in common, they also have some significant disparities that can be partly attributable to the various cultural environments in which they were both formed. Also, this essay offers the resources for a deeper comprehension of the literature on lean manufacturing and world-class manufacturing, and it can serve as an important resource for brand-new studies on these topics.

Keywords

Lean manufacturing, World class manufacturing, Production strategy

Implementation of BIM and VR in Immersive Tunnel Construction

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Abstract.

Immersed tunnel engineering has been gradually promoted as a significant method of reducing the load of traffic crossing rivers. Building information modelling and virtual reality technology are introduced into immersed tunnel engineering in this paper. Its technical merits and advantages are examined, along with the use of BIM + VR technology in practise on the Shenzhen-Zhongshan Bridge, which attests to the method's superiority and effectiveness.

Assessment Of Meteorological Droughts Over Hoshangabad District, India

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Abstract.

In this study, the meteorological drought characteristics (severity, frequency, and persistence) over the Hoshangabad district, Madhya Pradesh, India are analyzed. The percent departure from mean (PDM) is employed to describe the drought characteristics, considering the monthly rainfall data for the duration of 62 years (1951-2012). Rainfall during monsoon season contributes over 95% of the annual rainfall and thus, only monsoon season is considered for identifying the drought years. The entire duration of 62 years was divided into two epochs of 31 years i.e. 1951-1981 and 1982-2012. The results revealed that the rainfall over the district possesses remarkable inter-annual variability. The district is prone to droughts with a frequency of once in four years. More importantly, the comparative assessment of two epochs indicates an increase in frequency, severity, and persistence of droughts in the latter epoch. The frequency of droughts has tripled in 1982-2012 as compared to 1951-1981. Since Hoshangabad is a monsoon-dominated district with high agricultural importance, proper management strategies need to be devised to minimize the harmful consequences of droughts.

Effect of different design parameters on cycloidal gears - bending stress of straight bevel gear

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ABSTRACT:

Since gears play an important role in mechanical power transmission, a huge amount of work has been done on them to prevent breakage, noise and vibration, or to increase aspects of strength and density. This work uses a cycloidal profile rather than developing its ability to withstand the bending stress of a straight fit. The main objective is to investigate the effect of modulus, taper angle and roll radius on bending stress. From the generation process, the 3-D models are mathematically described as a set of points representing the cycloidal profile, which are fed into the FE solution. The proposed mathematical geometric model of a cycloidal gear was compared with existing published works and showed perfect agreement. Flexural strength is estimated based on vonmiss stress. The results show that the modulus plays a key role in minimizing the bending stress, the higher the modulus, the lower the value of the bending stress, reducing the rolling radius can well control the bending stress, while increasing the taper angle leads to to the reduction. of the bending stress. bending stress. bending stress. flexural strength

Keywords: convulsions; Cycloid profile; Fillerestress

The actions of pre-tensioned concrete sleepers (pcs) on rails

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Abstract:

One of the crucial parts of the railway structural system is the prestressed concrete sleeper (PCS). The load from the train wheel will be passed to the ground through the ballast (ground) on which PCS is resting. In Malaysia, the terrain varies greatly from one location to another. The load from the train may not be smoothly transferred to the ground if the PCS is supported by an uneven or unstable ground base, and if that occurs, the PCS may be damaged or split in half. The researchers evaluated various problematic PCS that sit on an uneven ground base in this study with assistance from Keretapi Tanah Melayu Berhad (KTMB) staff. Results were acquired by utilising the cutting-edge on-site equipment, which strengthened the KTMB premise on their issue spots. The data collection indicates that the deflection value is larger at KM20.75 compared to KM26.25, with values of 18.90mm and 1.48mm for commuter trains with six coaches and 8.45mm and 1.36mm for electric train service, respectively (ETS). The existence of a void beneath the rail track structure at KM20.75 as a result of soil settlement brought on by the subsurface water stream may have an impact on this outcome.

Implementation Of The Comprehensive Assessment Model In The Reform Of Irrigation District Water Use

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Abstract.

To boost agricultural production, save water, and support economic growth, water-saving reform in irrigated districts is crucial. Therefore, a fair assessment of the overall advantages of irrigation district water-saving reform is helpful for water planning and administration as well as irrigation district modernisation. The necessity and viability of water-saving reform in irrigation districts were briefly described through the compiling of pertinent literature, and the application progress of various evaluation models in the benefit evaluation of water-saving reform in irrigation districts was made clear. The issues and future directions of the benefit assessment of water-saving reform in irrigation districts are presented, and the currently popular benefit assessment model is detailed. All facets of human existence have been considered in benefit evaluation, which has expanded in both its application areas and the number of approaches used. Thus, it is crucial to summarise the theories and methods of evaluation.

Ozone-based post-treatment for water reuse at laboratory size from textile wastewater treatment plant effluent

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Abstract.

Traditional methods of treatment include sedimentation, aeration, and activated sludge can only get rid of organic material. At the end of the process, colour removal was needed in the waste water treatment. A water body's aesthetic value can be diminished by dye. The quality requirements for the textile sector in Indonesia do not include dye-containing materials. The goal of this study is to use the ozone oxidation method to improve the waste water quality for textile waste water treatment plants. Biological techniques were applied to use and treat actual waste water from the waste water treatment plant. The ozone treatment reactor has 2 L volume and flowed with ozone at a dose 0.05 and 0.5 mg/minute. Color and COD are the key characteristics that were eliminated from this investigation. Colors were removed with 92% and 93% efficiency, whereas COD was removed with 78% and 83.5% efficiency. The metrics COD, BOD5, total phenol, and total ammonia (NH3-N) have met the quality standards for textile waste water according to Minister of Environment Regulation No. 51/2014 and Government Regulation of Republic of Indonesia No. 82/2001 (Class 4 designation).

High-pressure common rail pumps have wear difficulties

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Abstract. The most vital parts of contemporary fuel injection systems are high-pressure pumps. A contemporary method that equips cars with either a diesel or a gasoline engine is common rail. The design of the pumps varies greatly depending on the fuel type and is more complicated for diesel engines that are more prone to wear. The parts that are worn out are those that are in constant contact, such as the plunger and hydraulic head assembly with valves and the driving shaft with roller and shoe. Wear is brought on by errors in the production process, poor use of the high-pressure pump, and other factors. Unsuitable material hardness, unsuitable coating, incorrect or incomplete machining, incorrect clearance or misalignment between components, unsuitable surface finish, dimensions outside of tolerances, unsuitable assembly process, unsuitable lubrication, contamination, or operating at high loads and temperatures can all be factors affecting wear. In this article, we'll identify, discuss, and highlight the several types of wear that common rail high-pressure pumps experience, emphasising how this wear affects the pumps' operation. By paying closer attention to the design details, manufacturing processes, and proper use of the high-pressure pumps, wear can be avoided.

Building a runway in the city of Tobolsk will help develop the country's road transportation system

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Abstract.

The building of a runway in the city of Tobolsk is the subject of this article. The expansion of the road network will give the region the ability to seize fresh chances. The author looks at the runway's structure and estimates the expenditures involved in building a facility for road transportation. identifies the key opportunities for the region's future development.

RECIRCULATING THE EXHAUST GAS FROM GAS-DIESEL ENGINES

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Abstract.

Exhaust gas recirculation (EGR) has been shown to effectively lower the nitrogen oxides (NOx) content of diesel fuel as well as a wide spectrum of harmful substances by lowering the amount of exhaust gases (EG). Depending on the gas-diesel engine's operating mode, a device implementation technique for the control law bypass EG.

Interpolymer Complex-Based Anti-Filtration Screen Is Used To Improve Irrigation Practises While Studying Irrigation Characteristics

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Abstract.

Targeted study on water resource management and effective irrigation water resource utilisation is given significant emphasis globally. One of the key challenges in this area is to enhance the way of watering of fields using affordable chemical and technical means, the creation of novel water-saving irrigation techniques, and the theory behind water-saving irrigation technologies. In this sense, it is crucial to use low-cost interpolymers to lessen soil composition and irrigation water infiltration.

Arsenic Heavy Metal Removal Potential Of Synthesized Silica Nanoparticles (Si-Nps) Using Corn Cob

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Abstract.

Recent research indicate that arsenic (As) toxicity pollution affects millions of people. Arsenic poisoning in paddy fields has turned into a recurring issue because it is one of the most poisonous and cancer-causing chemical elements. When arsenic-affected water is used for irrigation in the agricultural sector, the top soil is more likely to be contaminated, which can have an impact on the quality of crop production, including rice plants. The life cycle of the rice plant demands a sizable amount of water. Due to rice plants' unique capacity to absorb arsenic from the soil and irrigation water, arsenic intake from rice is much higher in Asean nations like Malaysia, Indonesia, and ThailandArsenic exposure among humans is significantly increased by the critical problem of arsenic moving from soil to plant systems. Applications of nanotechnology are essential for all types of fieldwork and research. In this study, silica nanoparticles were used to remove the contaminant of the heavy element arsenic by the application of nanotechnology. This study used a spectrophotometric approach to analyse silica nanoparticles with an emphasis on the removal of the heavy element arsenic.

A Review Of The Relationship Between Mixing, Microstructure And Strength Of Cementitious Products Containing Nanoparticles

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Abstract:

Concrete is a man-made multi-phase composite where coarse granular materials are embedded in a hard binder matrix that fills the space between the aggregate particles and glues them all together, strengthening over time with hydration. The addition of nanoparticles further improves concrete properties such as early strength, improved microstructure and better durability. Nanoparticles are added to cement compositions by dry mixing with cement or dispersion in water. A related challenge is the uniform dispersion of nanoparticles in the composite matrix. The type of mixer and mixing pattern affect the fresh and hardened properties of concrete. This paper investigates the effects of nanoparticle dispersion, mixer type and mixing pattern on the properties of cement-based composites.

Keywords: Cementitious composites, Dispersion technique, Microstructure, Nano-alumina, Nano-ferric oxide, Nano-silica, Strength factors.

Using Nanofiltration Polyetherimide Membrane To Remove Colours From Textile Effluent

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Abstract:

During the 19th century, the textile industries have grown quickly, and dyeing technology has been flourishing as a result. The lack of responsibility and experience in handling the wastewater containing dye, however, hinders its advancement. There are some new technologies for treating this kind of wastewater, and membrane technology is one of them since it is very good at removing colours from wastewater while using a negligibly little amount of energy. One of several eco-engineering advancements for water resource management sustainability is the development of membrane technology. The implementation of this membrane technology, particularly for the treatment of textile effluent in Indonesia, has a lot of opportunity for development. The aim of this research is to build nanofiltration (NF) membranes to address the issues of dye-containing wastewater and the demand for clean water in Indonesia. Additionally, a new selective layer will be added to the produced NF membrane using interfacial polymerization to enhance the effectiveness of the separation of dyes from wastewater that contains dyes. There were two experimental phases in this studyFirst, a PEI/Acetone/NMP (N-methyl-pyrollidone) polymeric dope solution was created utilising the variations 15/65/20, 16/64/20, and 17/63/20. According to this study, there are still a lot of possibilities for membrane-based textile wastewater treatment in Indonesia.

Key word: Membrane, polyetherimide, nanofiltration, acetone, reactive red.

Transportation system for logistics that is effective and secure

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Abstract:

The issues with the Russian transport and logistics complex are illustrated by the comparative feature of the values of the Logistics Efficiency Index indicators that is being provided. It was possible to justify the need for formalising the relationships (coordination of competing interests) of the participants in the logistics process in order to ensure the internal integrity and security of the transport and logistics complex's operation by taking into account the effectiveness of the transport and logistics complex from various perspectives (financial, production). The creation of a unique cyberphysical system utilising multi-agent systems, the Internet of Things, and blockchain was suggested as the solution to these problemstogether with Big Data and sophisticated technology for data mining. The transport and logistics complex was presented as a cyber-physical system, allowing for the following considerations: - as a continuous process of transport services, the improvement of the technology of which is proposed to be carried out using the process and design approaches, a mathematical description - through models based on the theory of mass service and coordination of economic interests of economic entities; - as an artificial intelligence (AI) system, where information interaction is organised on the principles of blockchain and the Internet of things, incorporating cognitive analysis, game theory, strategies for models to self-organize (such as the concept of group accounting of arguments), pattern recognition theory, and others.

An AR-based Worker Support System for Human-RobotCollaboration

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Abstract

Industrial robots would collaborate with human workers to carry out the assigned duties in human-robot collaborative manufacturing. Recent studies have shown that industrial robots can be controlled using recognised human motions as input. Yet, there is still a little information feedback loop between industrial robots and human workers. This project investigates the potential use of augmented reality (AR) technology in a worker support system for human-robot collaborative production in response to the requirement. Human workers can be naturally and immediately added to the robot orders and worker instructions virtually. An example case study serves as proof of the developed AR-based worker assistance system.

Mechanical Behavior of Glass Fiber Reinforced Polymer Pultruded Composite Gratings

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ABSTRACT

Well-designed and manufactured glass fiber reinforced polymer composite structures have several advantages over steeland conventional concrete structures such as high strength-to-weight ratio, good stiffness, good corrosion resistance and good damping capacity. In view of their higher cost however, their use is restricted to structures with smaller dimen- sions such as pedestrian walkways particularly where aggressive environmental conditions are encountered such as in chemical and water-treatment plants. The keys to success of these structures lie in the proper choice of the constituent materials, manufacturing method and knowledge of the behavior of the structure under the conditions encountered. Knowledge of the mechanical behavior is particularly important in this context. An investigation was therefore con- ducted by the authors, in partial fulfillment for the award of master of engineering science degree of Lamar University to the first author under the supervision of the second author [1], to study the response to loading of a glass fiber rein- forced polyester composite structure made by the pultrusion process by a reputed manufacturer. The structure chosen for this study was a grating, the details of which are shown in the paper. This type of structure is particularly useful for walkways. The experimental part of the investigation consisted of subjecting the grating to three-point bend test under different loading conditions. The load-deflection curve for each case was obtained and interpreted. One grating was loaded up to failure and the fractured zone was examined using a scanning electron microscope to interpret the micro- scopic failure features. Simulation of the experimental work was carried out using an industry-standard FEM softwareto compare the deflection values. The results are presented and discussed in this paper.

Keywords: Mechanical Behavior; GFRP Composite; Pultrusion; Grating; FEM; Deflection.

A Research Study on Solar Cooking Systems

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Abstract:

Energy is necessary for life and for all living things. Our everyday needs are being met, including those for cooking, lighting, heating and purifying water, etc. Also, although it is usually disregarded, maintaining excellent health is crucial for humans. In their houses, three billion people use wood, cow dung, coal, and other conventional fuels, which contributes to indoor pollution. Solar cooking is the only way to solve the aforementioned issue. Several locations across the world have access to a significant amount of solar energy, which is clean and simple to use. India uses more than 36% of its total energy production for cooking. So, it is necessary to create alternate cooking methods that are simple, clean, and affordablel. However, the development of an effective cooking system with solar thermal energy storage technology and a traditional cooking option that will permit the odd hours cooking is the only way to use this source of energy on a big scale.

An effort has been made to examine the background and most current developments in the field of solar energy cooking in this review paper. The study offers a thorough analysis of this sort of technology, including information on cooking principles, cooker varieties, and their capabilities. Moreover, a discussion of the application of Phase Change Material (PCM) in a solar cooking system that permits nighttime cooking.

Keywords: Cooking, Solar Energy, Pollution, Phase Change Material (PCM).

USE OF MODERN PUMPING TECHNOLOGY FOR DEWATERING IN A DEEP TRENCH WITH SOFT SOIL

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Abstract.

The soft soil layer slows down the excavation of the foundation pit because it has a limited carrying capacity, poor permeability, and is difficult to drain. This report describes the use of a novel dewatering technology in the dewatering of deep soft soil foundation pits. This technology uses an air compressor and vacuum pump to more effectively improve the efficiency of pumping and collecting water, which has positive effects on the economy and the environment.

Modeling of coal combustion in a frontal pulverised coal-fired boiler

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Abstract.

The pulverized coal combustion process in the coal-fired boiler is numerically modeled, and the findings are presented in this work. The numerical model was used to simulate the coal combustion process, which involves particle heating, devolatilization, char burning, turbulent flow, and radiative heat transfer. The Open Source CFD code, Code Saturn, which was established and developed by EDF R&D, was used to model the coal combustion in a power plant boiler in order to simulate operational circumstances and pinpoint inefficient variables. The modeling findings that were presented were produced using this code. Three-dimensional flue gas flow through the combustion chamber and heat exchangers was replicated in the simulation, and the behavior of the flow of air and pulverized coal through the burners was modeled.